

Book review

The History of Stainless Steel

Harold M. Cobb. ASM International, Russell Township, OH, USA, 2010, ISBN 978-1-61503-010-1 (paperback), £23.50, 359 pp.

We are approaching the commercial centenary of 'stainless steel', a material that seems familiar to everyone, yet it is actually several different materials and it is strictly neither stainless nor steel. This book is therefore timely and, to coin a phrase, it does what it says on the cover. With an evident passion for the subject, the author Harold Cobb tells the fascinating story of 'the miracle metal', as stainless steel has been called. Frankly, it is a terrific read, more a celebration than a mere history and few in the business would be better qualified than its author to tell the story. After graduating from Yale in 1942 as a metallurgical engineer, Cobb spent 22 years in the metals industry, before joining the American Society for Testing and Materials (ASTM). He was particularly associated with the unified numbering system (UNS) for metals, has edited more than 20 other books on steel and recently published a new edition of his own book, *Stainless Steels*.

This book is not to be confused with a text-book. It is primarily a story, including sufficient technical explanation to facilitate understanding, but otherwise being a compelling narrative that takes the reader from the uncertain early years, through exciting developments and applications, to the more mature current situation. The tale is illustrated by a veritable cornucopia of detail and plenty of photographs, some of which are in colour. We learn that the nineteenth century pursuit of a corrosion-resistant form of iron-based metal eventually led to three different alloys that have become collectively known as stainless steel -- martensitic, ferritic and austenitic -- all variants on the alloying of iron, carbon and chromium. Later, 'Duplex' forms of stainless steel, also including nickel, were developed and, in 1970, the invention of a new melting and refining system enabled stainless steel quality to be improved and its cost halved.

As with all mankind's great technical discoveries and innovations, the personalities involved are always a great fascination and this book does not disappoint in this respect. After endeavours in the nineteenth century, when

adding chromium to iron alloys had been observed to improve corrosion resistance, it was not until the early twentieth century that anyone experimented with combining chromium and carbon in an iron alloy, to create forms of 'stainless steel'. Cobb explains that, between 1905 and 1912, 'seven men, unknown to each other and living in four different countries, inadvertently discovered alloys that we now call stainless steel'. Important work was carried out in the USA, Germany and France, but especially in Sheffield, England, where according to Cobb, 'Harry Brearley is generally credited above all others as the initiator of the industrial era of stainless steel'. In 1912, while researching alloys for gun barrels, Brearley discovered the corrosion-resistant properties of a chromium--carbon--iron alloy and successfully cast the material in the following year, which eventually led to its use in cutlery. In a twist that might be all too familiar to British readers, Brearley's employers 'couldn't see any future in stainless steel', so that Brearley was obliged eventually to obtain his first patents in the USA and Canada.

Packed with information and anecdotes, Cobb's account is structured into sixteen readable chapters (250 pp.), with two helpful appendices (a bibliography, 6 pp., and especially a superb timeline, 76 pp.) and an effective index. After an introduction that serves well as an 'executive summary', chapters 2 to 6 and 11 cover the history of stainless steel, including a whole chapter devoted to Brearley. Chapters 7 to 10, plus 12 and 13, enthusiastically describe some of the early applications for stainless steel, including the Chrysler Building in New York, aeroplanes, cars and trains such as the Burlington Zephyr. The last three chapters, 14 to 16, address Cobb's particular interest in classification and the unified numbering of metals and alloys.

I have no hesitation in recommending this excellent book, which tells the extraordinary story of 'stainless steel' in a thorough yet absorbing style, quickly infecting its reader with the apparent exuberance of its author. I would expect both technically minded and generally interested readers to be more than satisfied by reading, or even just occasionally dipping into, this exciting account of what has become an everyday material.

Ian Sims